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(71)(72) Applicant and Inventor :SZEGHEÖ,
Miklós [HU/HU]; Hegyalja ut 5., H-
1016 Budapest (HU)

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(74) Attorney: PATENTBUREAU
DANUBIA, P.O. Box 198, H-1368
Budapest (HU)

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(54) Title: APPARATUS FOR THE EXTERNAL TREATMENT OF BODY PARTS BY MEANS
OF ACOUSTIC WAVES

(57) **Abstract**

Apparatus for the external treatment of body parts by means of acoustic waves, particularly body parts with congestion and vasoconstriction and/or for the excitation of nerve center. The invention is characterized in that the apparatus comprises a treatment head connected to an acoustic frequency generator, with a housing (1) and a signal source (5) arranged in the housing (1) and connected to the acoustic frequency generator, on one side of the housing (1), appropriately in the axis of the acoustic signal source, there being provided an opening (14) to be directed toward the part of the body to be treated.

WO 85/03634

PCT/HU85/00006

Apparatus for the external treatment of body parts by means of acoustic waves.

<<5>> The invention relates to an apparatus for the external treatment of body parts by means of acoustic waves, particularly for the treatment of body parts suffering from stasis, vasoconstriction, and/or for the excitation of nerve centers.

Up to now, acoustic waves have been used in therapy exclusively in the ultrasonic frequency range, <<10>> predominantly for the treatment of rheumatoid arthritis and other joint diseases. Up to now the treatment of poor circulation, in particular the treatment of vasoconstriction in limbs or other body parts with stasis that are inadequately supplied with blood, <<15>> relied exclusively on treatment with medications. In severe cases, these problems had to be treated with surgery. In many cases, this surgical operation meant the amputation of the limb that necrotized due to vasoconstriction. <<20>>

Researchers all over the world are working intensively on finding a more effective method to treat poor circulation and vascular disease.

<<25>> The objective of the invention is to find a solution that allows a more effective treatment of the above-mentioned diseases compared to earlier methods.

The invention is based on the discovery that acoustic waves can be used very successfully for the treatment of body parts with stasis suffering from vasoconstriction.

<<30>> It has also been realized that an additional therapeutic effect can be realized if the acoustic waves are directed at the nerve centers located at the body's surface.

WO 85/03634

2

PCT/HU85/00006

This objective is achieved with the apparatus according to the invention and its use in therapy, in particular by providing an apparatus, which comprises a treatment head connected to an acoustic frequency generator, <<5>> a housing, and an acoustic signal source – connected to the acoustic frequency generator – arranged in the housing, and which further possesses on one side of the housing, advantageously in the axis of the acoustic signal source, an aperture directed at the body part to be treated. <<10>> With the help of this treatment head it can be achieved that the acoustic sound frequency waves emerging through the aperture can be aimed directly at the diseased body part that suffers from stasis or vasoconstriction. <<15>>

Advantageously, the housing of the treatment head is executed as a cylindrical pipe with the acoustic signal source arranged along its axis.

In an advantageous embodiment of the invention, the acoustic signal source can be moved within the housing along the direction of the cylinder axis, whereby the acoustic signal source is in sealing contact with the inner surface of the housing. The advantage of this embodiment is that moving the acoustic signal source within the cylindrical pipe makes it possible <<25>> for nodal points of the acoustic waves to appear at predefined locations in front of the aperture directed at the body part to be treated, which allows an even more effective treatment of the diseased body parts. <<30>>

Preferably, one uses a loud speaker as the acoustic signal source. The advantage of using a loud speaker is that its use as acoustic signal source is extremely simple and inexpensive.

WO 85/03634

3

PCT/HU85/00006

It is practical to equip the housing of the treatment head with attachments with apertures of various sizes, which can be attached in dependence on the size of the body surface to be treated. Advantageously, these attachments are connected to the housing using a flanged locking ring. <<5>>

In a further embodiment of the invention, a switch connecting the acoustic signal source with the acoustic frequency generator is arranged in the space behind the acoustic signal source; <<10>> this switch may be manually actuated, but it seems to be a more practical solution to use a timer switch, on which the duration of the treatment can be set in advance. <<15>>

The acoustic frequency generator is a square-wave generator with adjustable frequency. Experience has shown that the sharply increasing square-wave signals increase the effectiveness of the treatment of the body part to be treated; <<20>> it is to be assumed that during the sharp increase the organism is not able to adapt as well as in the case of a sinusoidal stimulus.

Experiments have shown that the frequencies most suitable for the treatment of diseased body parts are those in a range between 1 Hz and 1000 Hz; <<25>> correspondingly the frequency of the acoustic wave generator of the apparatus according to the invention can be varied in a range between 1Hz and 1000 Hz. We have also noted that the temperature of the body parts being treated, <<30>> i.e. the heat sensation of the patient during the treatment, can vary. In some cases the patient perceives the respective body part as cold, in other cases as warm, and sometimes the patients feel a tingling.

WO 85/03634

4

PCT/HU85/00006

We have found that the treatment is effective if the patient senses heat in the body part being treated or feels a tingling sensation. <<5>> This heat sensation can be demonstrated with a thermometer at the skin surface, at the body part being treated, or in immediate proximity to the treated location. Correspondingly, a thermometer should be associated with the apparatus, whereby the thermometer is positioned at the body part being treated or in immediate proximity to the body part. <<10>> In the event that the thermometer shows a cooling effect, the frequency of the treatment <sic> and/or the intensity of the acoustic waves should be varied until heat or a tingling sensation is felt in the body part being treated.

One possible design of the treatment head of the apparatus according to the invention will be explained in more detail with the help of the enclosed drawing. <<15>> The drawing shows a semi-elevation/semi-section of the treatment head of the apparatus according to the invention.

The operating head comprises a housing 1, <<20>> which in our embodiment example is a cylindrical pipe, whereby the pipe's rear end is closed by a sealing plate 9 whereas at the front end an attachment 3 is secured to the housing by means of a locking ring 4. <<25>> The attachment 3 possesses an aperture 14, which is to be directed at the body part being treated.

The acoustic signal source in the housing 1 is a loud speaker 5. The loud speaker 5 is mounted to an axially movable piston 2 inside the housing. <<30>> The position of the piston 2 in the housing 1 can be fixed with the help of a screw 8; the screw 8 is movable in an axial groove 7 of the housing 1.

WO 85/03634

5

PCT/HU85/00006

With the help of a seal 11, the piston 2 is in completely seal-tight contact with the interior wall of the housing 1.

A switch 12 is provided in the interior of the housing 1, namely in the space behind the piston 2; <<5>> this switch connects the acoustic frequency generator (not shown) with the loud speaker 5 via a cable 13. The switch 12 may be manually actuated, but a timer switch – on which the duration of the treatment is set – can also be used.

<<10>> The attachment 3 for the housing 1 /as can be seen on the left side of the diagram/ is interchangeable. The treatment head is equipped with a set of attachments that consist of attachments 3 with apertures 14 of various sizes. If required, the attachment 3 – which can be detached by removing the locking ring 4 – can be omitted; <<15>> in this case the size of the aperture essentially corresponds to the cross section of the housing 1.

WO 85/03634

6

PCT/HU85/00006

Patent Claims:

1. Apparatus for the external treatment of body parts with acoustic waves, in particular of body parts with stasis or vasoconstriction and/or to stimulate nerve centers, <<5>> characterized in that the apparatus comprises one treatment head connected to the acoustic frequency generator, one housing /1/, and arranged in this housing /1/ one signal source, which is connected to the acoustic frequency generator, <<10>> and in that on one side of the housing /1/ an aperture /14/ is provided – advantageously in the axis of the acoustic signal source – that can be aimed at the body part to be treated.
2. Apparatus according to claim 1, characterized in that the housing /1/ is a cylindrical pipe with the signal source arranged in its axis. <<15>>
3. Apparatus according to claim 2, characterized in that the acoustic signal source can be moved along the direction of the cylinder axis and the acoustic signal source is matched to create seal-tight contact with the interior wall of the housing /1/. <<20>>
4. Apparatus according to any¹ of claims 1 to 3, characterized in that the acoustic signal source is a loud speaker /5/.
5. <<25>> Apparatus according to any of claims 1 to 4, characterized in that the housing is equipped with attachments /3/ with apertures /4/ of various sizes.
6. Apparatus according to claim 5, characterized in that the attachments /3/ are mounted to the housing /1/ with a flanged locking ring /4/. <<30>>

¹ The German word 'jedwelche' (here translated as any of) is non-standard and antiquated German (The Translator)

WO 85/03634

7

PCT/HU85/00006

7. Apparatus according to any of claims 1 to 6, characterized in that a switch /1/ that connects the acoustic signal source with the acoustic frequency generator is arranged in the housing, in the space behind the acoustic signal source. <<5>>
8. Apparatus according to claim 7, characterized in that the switch /12/ is a timer switch.
9. Apparatus according to any of claims 1 to 8, <<10>> characterized in that the acoustic frequency generator is a square-wave generator with adjustable frequency.
10. Apparatus according to any of claims 1 to 9, characterized in that the acoustic frequency of the acoustic frequency generator can be varied in a range between 1 Hz and 1000 Hz.<<15>>
11. Apparatus according to any of claims 1 to 10, characterized in that a thermometer is provided, which is placed on the body part being treated or in the immediate proximity of the body part.

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